2017 SURVEY OF SPECIALTY CROP GROWERS IN OHIO

IOWA STATE UNIVERSITY | RUTGERS School of Environmental and Biological Sciences | WATER CENTER UNIVERSITY OF MICHIGAN | USDA

Guang Han
Ethan D. Schoolman
Lois Wright Morton
J. G. Arbuckle

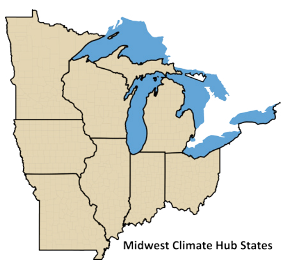
Sociology Technical Report 1053 | HE-2018-01 June 2018

2017 Survey of Specialty Crop Growers in Ohio

This document may be cited as:

Han, Guang, Ethan D. Schoolman, Lois Wright Morton, and J. G. Arbuckle. 2018. 2017 Survey of Specialty Crop Growers in Ohio. Sociology Technical Report 1053 (Iowa State University) | HE-2018-01 (Rutgers University). Department of Sociology, Iowa State University, Ames, Iowa. 40 pp.

Report design and format by Renea Miller, Department of Sociology, Iowa State University, Ames, Iowa. June 2018.
Photo credits: Lois Wright Morton, Mic Miller, and Bruce Stambaugh.



This research, North Central Fruit, Vegetable and Wine Growers' Assessment of Soil and Water Vulnerability Under Changing Climate Conditions and Extreme Weather Events funded by USDA-Agricultural Research Service (ARS) Midwest Climate Hub.

Survey research for this project was funded by the University of Michigan Water Center and by Rutgers University. The National Agricultural Statistics Service (NASS), Great Lakes Regional Field Office, served as the main contractor for the collection of survey data, and the National Association of State Departments of Agriculture (NASDA) served as a sub-contractor.

Contents

List of Figures

List of Tables

Study Overview

Specialty crops are an important component of the economy in the upper Midwest, with the 2012 U.S. Census of Agriculture valuing them at $4.7 billion. The states of Michigan and Ohio produce a diversity of annual and perennial specialty crops ranging from fruits, vegetables, greenhouse and nursery crops (see box insert for definition of specialty crops). Growing specialty crops in Michigan and Ohio in the past few years has been full of both promising opportunities and persistent challenges. Growers of specialty crops have benefited from increasing interest in “local food” from consumers and food businesses, and continued emphasis from experts on the importance of a diet rich in fruits and vegetables. At the same time, weather events—including highly variable and extreme precipitation and temperatures—and concerns about human and environmental health have spurred demand for food grown with minimal use of agricultural chemicals, and exerted pressure on growers to continually evaluate and update their practices.

The research presented in this report was motivated by the intersection of all of these trends. Despite the large and growing economic and cultural importance of specialty crop production in the region, growers of specialty crops are a relatively understudied group of farmers, as compared to growers of corn and other commodity crops elsewhere in the Midwest (Arbuckle et al. 2014; 2015; 2017; Morton et al. 2017a, 2017b; also see Johnson and Morton 2015; Kistner et al. 2017). To address this gap in knowledge, a survey was conducted of specialty crops growers in Michigan and Ohio during the winter and spring of 2017. The goal of this survey was to gather data on how growers are responding to new market opportunities and dealing with environmental and economic challenges. At the same time, the survey was designed to shed light on how growers’ decisions, practices and views in one area may be affected by developments or decisions in another. The result is a multi-faceted picture of the complex world of specialty crop growers in Michigan and Ohio summarized in three reports (Ohio—Sociology Technical Report 1053 | HE-2018-01, Michigan—Sociology Technical Report 1054 | HE-2018-02, and a combined Michigan-Ohio—Sociology Technical Report 1055 | HE-2018-03).

The term “specialty crop” is defined in law as “fruits and vegetables, tree nuts, dried fruits, and horticulture and nursery crops (including floriculture)” (7 U.S.C. 1621). Midwestern specialty crops include apples, asparagus, green beans, blueberries, cabbage, carrots, sweet and tart cherries, cranberries, cucumbers, Christmas trees, grapes, greenhouse crops, nursery crops, onions, peaches, plums, peas, bell peppers, potatoes, pumpkins, raspberries, strawberries, sweet corn, tomatoes, tree nuts, and watermelon.

This report on Ohio briefly details the survey methodology and then presents data on Ohio specialty crop growers in six sections: specialty crop farm characteristics; marketing channels; weather and climate; production and conservation practices; grower decision making; and grower characteristics.

Ohio

The state of Ohio, at the eastern edge of the Midwest, is the seventh most populous state in the United States at 11.69 million people. Ohio is one of the most densely populated states in the upper Midwest with 282 people per square miles distributed among major cities and many small towns and villages.

Agriculture is an important component of the state’s economy with annual sales of over $10 billion; of which specialty crops are almost $600 million. The state has an abundance of streams and rivers, some which flow south to the Ohio River and others in the northern part of the state that flow north into

Lake Erie, one of the five Great Lakes of the United States. In recent years, Lake Erie water quality has been a major concern with particular interest in agriculture's contribution to excess nutrients flowing off-farm into local waters and the lake. The climate of the region is strongly influenced by the Great Lakes and in recent years has experienced an increase in annual precipitation and storm intensities, which influence soil moisture and specialty crop management and production decisions.

Figure 1. The geology and climate of the Great Lakes influence soil types, precipitation and temperature variations, microclimates and changing climatic conditions that Michigan and Ohio specialty crop growers factor into their management decisions.

Survey Design

The 2017 Survey of Specialty Crop Growers in Michigan and Ohio was conceived in 2014 by Dr. Ethan D. Schoolman, then a postdoctoral fellow at the University of Michigan (U-M), and funded by the Water Center at the U-M Graham Sustainability Institute. Dr. Thomas Princen and Dr. Margaret Kalcic were co-investigators on the original project proposal. Dr. Lois Wright Morton and Dr. J. Arbuckle, from Iowa State University, joined the project as collaborators in 2015, and assisted Dr. Schoolman in developing the survey questionnaire and sampling approach. To ensure a representative survey sample, robust response rate, and accurate processing of returned survey reports, the project partnered with the National Agricultural Statistics Service (NASS). NASS Great Lakes Regional Field Office staff members Kif Hurlbut (deputy director) and Marty Saffell (statistician specialist) were the project's main contacts. Rutgers University contributed additional funding to the project at a later date. The USDA-ARS Midwest Climate Hub provided funding for data analysis and preparation of the technical reports. Guang Han, a Ph.D. student in Sustainable Agriculture and Agricultural Education at Iowa State University joined the project in 2017 and led data analysis and tabulation for this report.

For the purposes of this project, "specialty crop farm operation" was defined as an operation which, according to the latest data available to NASS, was harvesting at least 1 acre of fruit and/or vegetable crops in 2016. Out of 8,383 farm operations in Michigan and Ohio that satisfied these criteria, 3,000 were selected for participation in the survey. Prior to sample selection, the survey population was stratified by farm size and type (primarily growing fruit crops, or primarily growing vegetable crops), to ensure that sub-groups within the survey sample would be representative of sub-groups within the overall population of farm operations. See table 1; figure 2 for sampling frame. Survey respondents first received the questionnaire by mail in late January, 2017; respondents who did not return the first questionnaire were mailed the questionnaire a second time in mid-February. In late February and early March, respondents who did not return the second questionnaire were contacted several times by phone by survey enumerators and given the opportunity to complete the survey verbally. The data collection phase of the project was complete by the end of March, 2017. 1,401 valid survey reports (46.7 percent of the survey sample) were returned to the project, but of these, a significant number were from operators who were no longer actively farming or who were no longer growing specialty crops. 881 survey reports (29.3 percent of the survey sample) were both valid and usable, meaning that these reports were completed for operations that were currently growing specialty crops. Of these 881 usable reports, 698 were from growers producing for "fresh market", defined as "vegetables and fruits that are sold raw, without being frozen, cooked, or subject to other forms of preservation prior to sale."

Table 1. Survey responses—Michigan and Ohio sampling frame

Stratum	Full universe (N)	Sample (n)	Returned surveys	Response rate	Usable surveys
Fruit, Small (1-10 acres in fruit)	2,777	600	297	49.5%	145
Vegetable, Small (1-10 acres in vegetables)	2,939	600	293	48.8%	152
Fruit, Medium (10.1-75 acres in fruit)	990	575	273	47.5%	210
Vegetable, Medium (10.1-75 acres in vegetables)	916	575	276	48.0%	167
Fruit, Large (75+ acres in fruit)	381	325	135	41.5%	128
Vegetables, Large (75+ acres in vegetables)	380	325	127	39.1%	79
TOTAL	8,383	3,000	1,401	46.7%	881

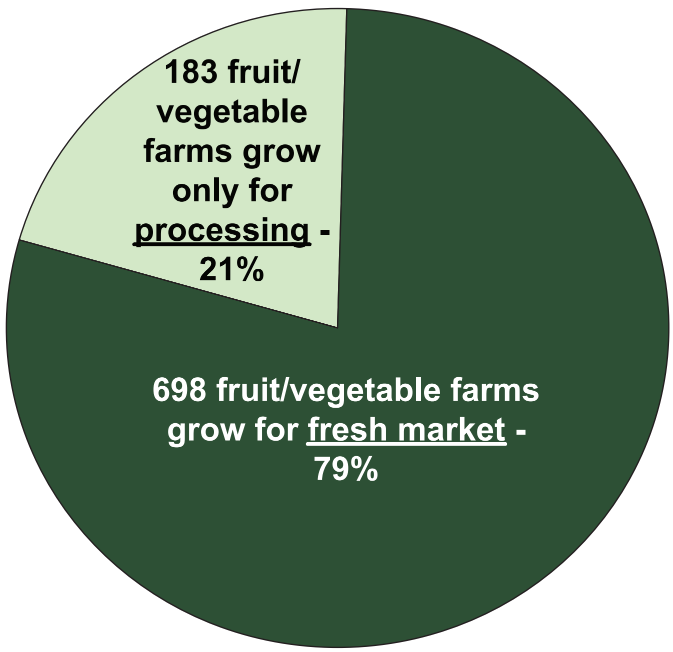


Figure 2. **Michigan and Ohio specialty crop farms producing for fresh markets and processing.**

Ohio Specialty Crop Farm Characteristics

This section provides basic descriptive information about the farms in our sample. Tables cover farm size, land tenure, and types of crops grown. Type of crops grown is presented by acreage category, diversity of crops, and other tabulations. Type and diversity of livestock raised are also presented.

Table 2. Ohio acres owned, rented in, rented out, and overall operated in 2016 (n=275)

Category	Percent of growers	Mean	Median	Standard Deviation	Range
Owned land (n=261)	94.9%	131.3	46.0	237.4	1-1,600
Rented (n=96)	34.9%	275.4	46.5	806.6	1-7,100
Rented to others (n=39)	14.2%	86.3	45.0	130.1	1-636
All acres operated (n=275)	100%	208.5	50.0	581.8	2-7,100

Table 3. Ohio farm size, by acres category (n=275)

Category	Percent
1-9 acres	15.6%
10-49 acres	34.2%
50-99 acres	17.8%
100-199 acres	13.5%
200-499 acres	9.1%
500-999 acres	5.1%
1,000-1,999 acres	2.5%
>2,000 acres	2.2%

Table 4. Ohio acres of fruits and vegetables grown for fresh market and/or processing (n=275)

Market	Percent of growers	Mean	Median	Standard Deviation	Range
Vegetables for fresh market (n=201)	73.1%	39.3	6.0	181.1	1-1,974
Fruit for fresh market (n=165)	60.0%	9.8	2.0	21.6	1-140
Vegetables for processing (n=26)	9.5%	61.4	22.5	74.7	1-260
Fruit for processing (n=29)	10.5%	9.5	5.0	15.3	1-60

Table 5. Ohio growers by market channels used (n=275)

Market	Percent
Fresh market only	81.5%
Processing only	9.8%
Both fresh market and processing	8.7%

Table 6. Ohio growers by specialty crop type (n=275)

Crop type	Percent
Vegetables only	33.8%
Fruits only	21.8%
Both fruits and vegetables	44.4%

Table 7. Ohio vegetables produced for fresh market, by acres category (n=201)

Category	Percent
1-9 acres	57.7%
10-49 acres	33.3%
50-99 acres	3.5%
100-199 acres	2.5%
200-499 acres	1.0%
500-999 acres	1.0%
1,000-1,999 acres	1.0%
>2,000 acres	0.0%

Table 8. Ohio fruits produced for fresh market, by acres category (n=165)

Category	Percent
1-9 acres	77.6%
10-49 acres	17.6%
50-99 acres	1.8%
100-199 acres	3.0%
200-499 acres	0.0%
500-999 acres	0.0%
1,000-1,999 acres	0.0%
>2,000 acres	0.0%

Table 9. Ohio vegetables produced for processing, by acres category (n=26)

Category	Percent
1-9 acres	38.5%
10-49 acres	15.4%
50-99 acres	23.1%
100-199 acres	15.4%
200-499 acres	7.7%
500-999 acres	0.0%
1,000-1,999 acres	0.0%
>2,000 acres	0.0%

Table 10. Ohio fruit produced for processing, by acres category (n=29)

Category	Percent
1-9 acres	82.8%
10-49 acres	10.3%
50-99 acres	6.9%
100-199 acres	0.0%
200-499 acres	0.0%
500-999 acres	0.0%
1,000-1,999 acres	0.0%
>2,000 acres	0.0%

Table 11. Ohio number of crop types grown for sale (n=275)

Mean	Median	Standard Deviation	Range
4.4	3	3.5	0-13

Table 12. Ohio number of crop types grown for sale, by frequency category (n=275)

Category	Percent
No response	5.1%
1 type	23.6%
2-5 types	36.7%
6 or more types	34.5%

Table 13. Ohio percent of growers producing each crop type (n=275)

Crop type	Percent
a. squash, pumpkin, cucumber, or melon	60.4%
b. tomatoes, peppers, or eggplant	58.5%
c. berries (any kind)	44.0%
d. sweet corn (not corn for grain)	41.1%
e. peas or snap beans	33.8%
f. chives, garlic, leeks, or onions	31.6%
g. apples, pears, or other tree-fruits	30.9%
h. carrots, table beets, other root crops	26.9%
i. leafy greens (lettuce, spinach, kale, chard)	26.5%
j. potatoes (any kind)	26.2%
k. corn for grain or silage	24.4%
l. stalk greens (asparagus, celery, rhubarb)	24.0%
m. soybeans	23.6%
n. hay or other forage crops	21.8%
o. grapes	18.9%
p. herbs	18.5%
q. wheat, small grains, or oats	18.2%
r. flowers, ornamental shrubs/trees	17.5%
s. other	11.3%
t. sugarbeets	1.5%

Table 14. Ohio mean number of types of livestock or livestock products raised for sale, livestock producers only (n=59)

Mean	Median	Standard Deviation	Range
1.7	1	1.2	1-6

Table 15. Ohio number of types of livestock or livestock products raised for sale (n=275)

Number of types	Percent
0	78.5%
1	13.1%
2	3.6%
3	3.6%
4	0.4%
5	0.7%

Table 16. Ohio percent of livestock farmers producing each type of livestock or livestock products for sale (n=59)

Livestock types	Percent
a. hens or pullets for eggs	79.7%
b. beef cattle	64.4%
c. sheep and/or goats	39.0%
d. hogs	33.9%
e. other	23.7%
f. broilers (chickens for meat)	15.3%
g. dairy cattle	11.9%
h. turkeys	8.5%

Table 17. Ohio total gross revenue from farm operation, by revenue category (n=275)

Category	Percent
Less than $10,000	27.7%
$10,000 – $49,999	23.4%
$50,000 – $149,999	19.9%
$150,000 – $349,999	12.9%
$350,000 – $999,999	8.2%
$1,000,000 or more	7.8%

Table 18. Ohio farm size categories corresponding to USDA ERS "Revised Farm Typology" (n=275)

Category	Percent
Small: Less than $350,000	84.0%
Medium: $350,000 – $999,999	8.2%
Large: $1,000,000 or more	7.8%

Note. Farm size categories adhere to the updated typology issued by USDA ERS (Hoppe and MacDonald 2013).

Ohio Marketing Channels

The contemporary "local food movement" has emerged as an important complement to the earlier, and continuing, push to grow and produce food in an environmentally responsible way (Janssen 2017; King, Hand, and Gomez 2015). Definitions of "local food" vary widely, and experts disagree on the relationship between local food, public health, and sustainability (Forssell and Lankoski 2014; Schoolman 2018). But however it is defined, the market for local food has grown by leaps and bounds for the past ten years. In 2015, according to USDA, approximately $8.7 billion of food, from over 167,000 farm operations, was sold through direct marketing, a little more than half of which was due to sales of raw commodities (National Agricultural Statistics Service 2016a). Michigan and Ohio have played important roles in the growth of the local food market: Michigan ranked 7th and Ohio 10th among states according to total direct-to-consumer sales, which in Michigan involved 4,742 and in Ohio 5,269 farm operations (National Agricultural Statistics Service 2016b).

Aside from the 2015 USDA Local Food Marketing Practices Survey, little systematic survey data have been collected on how local food is marketed, how these channels for marketing for local food have evolved over time, and what farmers think about local food as a source of future revenue. The findings reported below begin to fill these gaps.

This section presents findings on how growers of specialty crops earn revenue for their farms, especially with respect to marketing channels associated with "local food," such as farmers markets, CSAs, and produce auctions. Other survey questions explored farmers' general outlook on "local food" as a marketing category, and engagement with organizations that facilitate growers' access to local markets.

Table 19. Ohio percent of 2016 gross revenue from various fresh market channels (n=249)

Market channel	More than 50%	26% to 50%	10% to 25%	1% to 10%	0%
a. Sales through your own farmstand or “pick your own” operation	36.5%	5.2%	10.0%	14.5%	33.7%
b. Farmers’ markets	14.5%	9.2%	10.0%	12.0%	54.2%
c. Produce auctions	6.4%	2.8%	5.6%	10.0%	75.1%
d. Wholesalers, distributors, brokers, or packing houses	6.4%	2.8%	3.2%	8.0%	79.5%
e. Selling to other farmers for resale at a farmers’ market or other “direct-to-consumer” outlet	2.4%	3.6%	3.2%	18.1%	72.7%
f. Small, independent grocery stores with one or a few locations	1.6%	2.4%	4.0%	15.3%	76.7%
g. Selling directly to restaurants or caterers	1.6%	1.2%	2.8%	8.8%	85.5%
h. Community Supported Agriculture (CSA)	1.6%	2.0%	1.6%	4.0%	90.8%
i. Food hub, growers’ cooperative, or small farms cooperative	1.6%	0.8%	0.0%	3.6%	94.0%
j. Selling directly to large retailers like Kroger or Meijer	0.8%	1.6%	2.0%	1.2%	94.4%
k. Value-added products made on farm or in community kitchens (jams, sauces, cider, etc.)	0.4%	1.6%	3.6%	9.2%	85.1%
l. Selling directly to institutions like schools or hospitals	0.0%	0.8%	1.2%	3.2%	94.8%

Table 20. Ohio number of years using various fresh market channels for local food systems

Market channels	Mean years using	Standard Deviation
a. Sales through your own farmstand or “pick-your-own” operation (n=135)	27.3	28.5
b. Farmers markets (n=95)	13.4	11.2
c. Selling to other farmers for resale at a farmers’ market or other “direct-to-consumer” outlet (n=51)	18.0	18.5
d. Produce auctions (n=53)	10.7	6.5
e. Small, independent grocery stores with one or a few locations (n=44)	24.6	27.1
f. Value-added products made on-farm or in community kitchens (jams, sauces, cider, etc.) (n=27)	17.3	18.7
g. Selling directly to restaurants or caterers (n=32)	13.8	13.8
h. Community Supported Agriculture (CSA) (n=23)	7.7	8.1
i. Food hub, growers’ cooperative, or small farms cooperative (n=14)	10.0	14.1
j. Selling directly to institutions like schools or hospitals (n=9)	17.6	12.5

Table 21. Ohio number of farmers' markets at which specialty crop farmers sell (n=114)

Number	Percent	(n)
No response	11.4%	13
1	48.2%	55
2	22.8%	26
3	7.9%	9
4	9.6%	11

Figure 3. **Farmers market distribution in Ohio and the number of specialty crop growers who sell at those markets.**

Table 22. Ohio vegetable and fruit sales to fresh markets within county (n=249)

Percent growers selling to in-county fresh markets	Mean percent of growers' fresh produce sold within county	Standard Deviation
79.9%	70.2%	34.4%

Table 23. Ohio importance of "local food" markets to growers' plans for their farm operation (n=265)

Category	Percent
Not important	10.9%
Slightly important	9.8%
Important	25.7%
Very Important	53.6%

Table 24. Ohio engagement with local food groups and organizations

Have you ever	Yes	No, but I would like to do this	No, and I am not interested in doing this
a. Worked with nonprofit groups that help farmers to sell food locally? (n=245)	24.9%	22.0%	53.1%
b. Worked with university agricultural extension to learn how to sell food locally? (n=249)	23.7%	27.7%	48.6%
c. Taken advantage of government programs designed to support farmers who sell food locally? (n=252)	19.8%	26.6%	53.6%
d. Donated produce from your farm to food pantries, soup kitchens, or similar organizations (including through gleaning)? (n=255)	58.4%	11.4%	30.2%

Table 25. Ohio percent of growers receiving 2016 revenue from selected additional sources (n=275)

Source	Percent
Agri-tourism (outdoor activities, farm tours, and "pick-your-own" operations)	18.9%
Provide services or consulting to other farmers (planting or harvesting on contract, other custom work, seed sales, equipment rental, etc.)	8.0%
Rent out your property for non-farm uses (hunting, weddings, etc.)	7.6%

Ohio Weather and Climate

Michigan and Ohio produce a wide variety of high-value specialty crops. These crops are more profitable on a per-acre basis than many row crops; however, they also have higher production-related risks. They are generally more sensitive to weather stressors and require more intensive management compared to traditional row crops. Temperature and precipitation fluctuations are strongly influenced by Great Lakes weather patterns and these directly impact the quality and quantity of specialty crop production and indirectly influence the timing of crucial farm decisions. Pest, weeds, and diseases management decisions are especially affected by weather variability and a changing climate (Kistner et al. 2017). With these issues in mind, one group of survey items asked growers to identify concerns that are influencing their farm operations, to relate recent experiences of extreme weather events, and to share views on how their operations will likely cope with climate change.

Table 26. Ohio grower level of concern about potential threats to their farm operations

	Potential threats	Not concerned	Slightly concerned	Concerned	Very concerned
a	Increased weed or insect pressure (n=244)	11.9%	24.6%	43.9%	19.7%
b.	Changes in health or timing of pollinators (n=244)	17.6%	25.4%	30.7%	26.2%
c.	Fluctuations in spring temperatures (n=252)	17.5%	25.4%	35.7%	21.4%
d.	Longer dry periods and drought (n=254)	19.3%	31.5%	31.9%	17.3%
e.	Higher incidence of crop disease (n=242)	16.5%	29.8%	36.0%	17.8%
f.	Increased heat stress on crops (n=248)	19.0%	29.0%	36.3%	15.7%
g.	More frequent extreme rains (n=251)	22.3%	32.3%	29.9%	15.5%
h.	More buyers requiring food safety audits, such as USDA-Harmonized Good Agricultural Practices (GAP), Good Handling Practices (GHP), etc. (n=244)	30.7%	27.5%	25.4%	16.4%
i.	Unavailability of workers for my farm (n=247)	47.0%	19.0%	16.6%	17.4%
j.	Increased flooding (n=249)	56.6%	20.1%	16.5%	6.8%

Table 27. Ohio percent of growers experiencing severe weather on land farmed in the past five years

Severe weather type	Percent
Significant drought (n=258)	58.1%
Saturated soils or ponding (n=255)	53.7%
Significant flooding (n=249)	24.1%

Table 28. Ohio perceived risks and capacity related to weather and climate change

Risk and capacity type	Disagree	Uncertain	Agree
a. I have the knowledge and technical skills to deal with most weather-related threats to my farm operation (n=250)	12.8%	38.4%	48.8%
b. There's too much uncertainty about the impact of climate change to justify changing my farming practices/strategies (n=241)	14.9%	39.0%	46.1%
c. I have the financial resources to deal with most weather related threats to my farm operation (n=249)	23.7%	36.9%	39.4%
d. Available best management practice technologies may not be enough to protect my farm from the impacts of climate change (n=239)	25.9%	50.2%	23.8%
e. Climate change is not a big issue because human ingenuity will enable us to adapt to changes (n=245)	33.1%	36.3%	30.6%
f. My farm operation will likely be harmed by climate change (n=244)	30.3%	51.6%	18.0%
g. My farm operation will likely benefit from climate change (n=239)	36.4%	52.3%	11.3%

Ohio Production and Conservation Practices

Conservation practices encompass a wide range of strategies designed to protect soil from erosion and improve soil health, prevent off-farm loss of nutrients into nearby lakes and streams, reduce reliance on agricultural chemicals for pest and weed management, and balance productivity imperatives with natural resource conservation (Robertson 2015; Palm et al. 2014). Survey items in this section examine growers' historical uses of different conservation practices, applications of naturally-occurring and synthetic fertilizers, insecticides and herbicides, organic agriculture practices, and an in-depth look at use of cover crops.

Table 29. Ohio use of selected production and conservation practices (n=275)

Practice	Percent used	Mean years used	Standard Deviation
a. Plant cover crops (n=143)	65.8%	18.9	19.3
b. Crop rotation (n=172)	65.5%	27.2	24.0
c. Nutrient management (testing soil, manure, or plant tissue to determine fertilizer rates) (n=159)	59.3%	20.1	15.8
d. Drip irrigation (also called "trickle irrigation") (n=138)	50.5%	14.3	9.9
e. Integrated pest management (managed use of pest-resistant varieties, scouting and considering pest thresholds before spraying) (n=130)	49.5%	18.6	15.0
f. Use manure, compost, bone meal, or other organic materials, as a significant source of fertilizer (n=131)	48.7%	16.8	12.4
g. Drain some or all fields with subsurface tile drains (n=122)	46.2%	29.3	27.3
h. Maintain portions of crop fields as grass, trees or wild vegetation (n=114)	43.6%	21.9	22.1
i. Biological pest control (use beneficial insects and natural enemies to control pests and weeds) (n=75)	28.4%	16.6	12.2
j. Drain some or all fields with surface ditches (n=73)	28.0%	27.0	26.3
k. Use a greenhouse or hoophouse to grow vegetable and/or fruit crops during cold-weather months (n=75)	27.3%	13.6	16.6
l. Reduced tillage (strip-till, ridge-till) (n=41)	15.6%	20.0	13.8
m. Continuous no-till (no-till every year) (n=30)	12.0%	18.7	13.4
n. Intercropping (plant two or more crops in the same rows at the same time) (n=30)	10.9%	15.0	12.1
o. Precision agriculture with technology such as GPS, GNSS, and variable rate technology (n=24)	9.5%	10.3	5.8

Table 30. Ohio width of buffer strips of grass, trees, or wild vegetation in fields next to streams or creeks (n=241)

Distance	Percent
0-24 feet	22.8%
25-49 feet	22.8%
50-99 feet	8.7%
100 feet or more	11.6%
No streams or creeks next to fields	34.0%

Table 31. Ohio timing of selected agricultural practices (n=275)

Practice	Percent using	Dec. thru Feb.	Mar. thru May	Jun. thru Aug.	Sep. thru Nov.
Apply synthetic fertilizer	61.5%	3.3%	52.0%	25.5%	13.5%
Apply manure, compost, or other organic materials	54.2%	21.1%	28.4%	12.0%	22.9%
Apply conventional insecticides, herbicides or fungicides	66.9%	2.5%	43.3%	63.3%	28.0%
Apply organic insecticides, herbicides or fungicides	38.2%	2.2%	21.1%	33.5%	16.0%
Apply ANY insecticides, herbicides or fungicides	84.0%	4.0%	52.7%	80.0%	37.1%
Sow cover crops	52.4%	3.6%	7.6%	12.0%	47.3%
Till fields	66.2%	5.1%	55.3%	21.5%	29.8%

Table 32. Ohio use of selected organic management practices (n=275)

Practice	Percent using	Mean years used	Standard Deviation
a. Certified organic or transitioning to certified organic (n=20)	7.3%	7.8	8.1
b. Organic in practice, but not certified or transitioning to certified (n=62)	22.9%	13.2	9.6
c. “No-spray” (n=28)	10.5%	16.7	12.0

Table 33. Ohio number of cover crops types used (n=275)

Number	Percent
0	34.2%
1	22.9%
2	14.5%
3	10.9%
4	5.1%
5	4.7%
6	3.3%
7	1.8%
8	1.8%
9+	0.8%

Note: On average, in 2016 each grower planted 1.8 cover crops (Standard Deviation=2.1).

Table 34. Ohio types of cover crops generally used (n=181)

Type		Percent
a.	Rye	71.8%
b.	Clover	37.0%
c.	Radish	31.5%
d.	Oats	30.9%
e.	Buckwheat	26.5%
f.	Wheat	21.0%
g.	Peas	13.3%
h.	Vetch	11.0%
i.	Other	11.0%
j.	Sudan-grass	9.4%
k.	Barley	8.8%
l.	Mustard	6.1%

Ohio Grower Decision Making

From year to year, growers make major decisions about what to plant and how to farm. From month to month and even day to day, growers continually update their plans in the face of changing environmental circumstances and market conditions (Knowler and Bradshaw 2007; Burton 2014; McGuire et al. 2015; Morton et al. 2017). In this section, data are presented on factors that growers reported influencing their decisions, including social networks and crop advisors, engagement with farming organizations, and personal attitudes and values about farming and the relationship between agriculture and the natural environment.

Table 35. Ohio growers ratings of influence of selected entities on farm operation decisions

Entities	No influence	Some influence	Strong influence
a. Feedback from individual consumers, independent grocery stores, or other small buyers (n=247)	22.7%	38.9%	38.5%
b. Other farmers (n=245)	28.2%	53.5%	18.4%
c. University Extension (staff, online info, etc.) (n=244)	33.6%	47.5%	18.9%
d. Sales representatives for seeds, crop varieties, pesticides or fertilizers (n=243)	39.9%	48.1%	11.9%
e. Food safety third party auditors and consultants (n=241)	50.6%	29.9%	19.5%
f. Major farm organizations with a broad focus (Farm Bureau, Vegetable Growers, etc.) (n=243)	49.4%	41.6%	9.1%
g. Government agriculture or conservation agencies (n=241)	51.5%	38.6%	10.0%
h. Farm organizations focused on local food (n=237)	54.0%	35.0%	11.0%
i. Farm organizations focused on sustainable farming (n=237)	54.9%	33.3%	11.8%
j. Conservation or environmental groups (n=237)	61.6%	34.2%	4.2%
k. Food wholesalers or distributors, grocery store chains, or other large buyers (n=239)	69.0%	18.4%	12.6%
l. Private crop or livestock consultant (n=231)	73.2%	19.5%	7.4%
m. Landlord or management firm (n=224)	86.6%	11.6%	1.8%

Table 36. Ohio grower interactions with agricultural organizations (n=275)

Interaction	Percent
a. I read their mailings, email updates, etc.	68.4%
b. I pay membership dues	49.8%
c. I attend at least one meeting a year	48.7%
d. I serve on committees or in leadership roles	16.4%

Table 37. Ohio grower rating of the importance of selected factors in farm operation decision making

Decision factors	Not Important	Slightly Important	Important	Very Important
a. Think about the health of people who eat food grown on your farm (n=577)	2.0%	4.0%	32.7%	61.4%
b. Minimize soil erosion (n=576)	5.6%	10.9%	39.1%	44.4%
c. Maintain or increase soil organic matter (n=570)	3.6%	7.9%	44.4%	44.0%
d. Minimize the use of pesticides and fungicides (n=578)	1.6%	12.3%	43.9%	42.3%
e. Minimize nutrient runoff into waterways (n=571)	10.1%	11.3%	42.5%	36.0%
f. Keep your fields clean (n=576)	2.8%	11.2%	50.2%	35.9%
g. Consider the health of streams on/near your land to be your responsibility (n=567)	3.6%	14.5%	46.8%	35.1%
h. Use cover crops between harvest and planting (n=565)	23.0%	19.0%	30.6%	27.4%
i. Be active in your community (n=576)	7.0%	30.7%	37.7%	24.6%
j. Manage for both profitability and minimization of environmental impact (n=572)	2.8%	14.2%	58.5%	24.4%
k. Put long-term conservation of farm resources before short-term profits (n=573)	5.3%	22.6%	47.7%	24.3%
l. Have the highest profit per acre (n=576)	13.1%	27.8%	35.1%	24.1%
m. Support other businesses in your community (n=579)	4.7%	20.1%	51.6%	23.6%
n. Maintain habitat for wildlife (n=575)	14.9%	31.0%	31.9%	22.2%
o. Have the highest yields per acre (n=574)	12.4%	25.2%	42.0%	20.4%
p. Create opportunities for people to learn about farming (n=574)	10.2%	26.1%	43.7%	20.0%
q. Use the latest seed and chemical technology (n=571)	27.3%	19.4%	34.0%	19.4%
r. Work to get healthy food to people who cannot afford it (n=573)	10.7%	31.7%	38.3%	19.3%
s. Help friends and neighbors with farm tasks (n=578)	8.1%	27.0%	48.4%	16.5%
t. Avoid fall tillage (n=567)	30.7%	29.5%	26.6%	13.1%
u. Minimize tillage (n=571)	19.0%	33.1%	35.9%	12.1%
v. Share equipment with friends and neighbors (n=572)	30.0%	27.2%	31.6%	11.2%
w. Create economic opportunities for other people in your community (n=570)	13.8%	34.8%	40.5%	10.9%
x. Be a leader in your community (n=573)	27.9%	34.8%	27.9%	9.4%
y. Be active in farm organizations (n=570)	28.4%	39.1%	23.9%	8.6%
z. Have the most up-to-date equipment (n=577)	31.6%	40.4%	24.8%	3.2%

Ohio Grower Characteristics

In this section, basic socioeconomic characteristics of growers and farm operations are presented. These characteristics offer insights into grower experiences, years in operation, off-farm occupations that contribute to household income, and future aspirations for the farm to produce household income.

Table 38. Ohio years operating current farm, by years category (n=255)

Category	Percent
1-5 years	7.8%
6-10 years	18.0%
11-15 years	18.0%
16-20 years	11.4%
21 years or more	44.7%

Note. Mean=22.1, Standard Deviation=14.3.

Table 39. Ohio years operating any farm, by years category (n=239)

Category	Percent
1-5 years	6.3%
6-10 years	13.8%
11-15 years	15.1%
16-20 years	9.2%
21 years or more	55.6%

Note. Mean=26.7, Standard Deviation=17.0, n=239.

Table 40. Ohio occupation status of specialty crop growers

Question	Yes	No	N/A
In addition to your farm occupation, do you have any off-farm occupations? (n=252)	47.2%	52.8%	-
Do you spend the majority (50 percent or more) of your worktime in off-farm occupations? (n=249)	28.9%	65.9%	5.2%

Table 41. Ohio occupation status of specialty crop growers' spouses

Question	Yes	No
Does your spouse do farm work on your farm operation? (n=222)	78.8%	21.2%
Does your spouse spend the majority (50 percent or more) of his/her worktime in off-farm occupations? (n=219)	40.2%	59.8%

Table 42. Ohio farm workers by type (n=275)

Type	Percent	Mean	Standard Deviation
Family members (n=208)	75.6%	3.5	2.2
Permanent employees (121 days or more per year) (n=63)	22.9%	7.7	19.5
Seasonal workers (120 days or less per year) (n=139)	50.5%	16.7	62.6
Migrant workers (seasonal workers who travel to do farm work) (n=29)	10.5%	48.4	126.6
Interns or volunteers (n=40)	14.5%	3.8	5.5

Note. The survey question about family members employed on-farm may not have been interpreted consistently by all respondents.

Table 43. Ohio 2016 household income from farm, by percent category (n=243)

Category	Percent
None	6.6%
1% to 25%	37.0%
26% to 50%	14.8%
51% to 75%	8.6%
76% to 100%	32.9%

Note. Mean= 46.9%, Standard Deviation=38.5%.

Table 44. Ohio proportion of total household income growers would like to make from the farm, by percent category (n=223)

Category	Percent
None	1.3%
1% to 25%	22.0%
26% to 50%	21.1%
51% to 75%	8.5%
76% to 100%	47.1%

Note. Mean=63.3%, Standard Deviation=35.8%.

Table 45. Ohio confidence that farm will provide hoped-for income five years from now (n=251)

Category	Percent
Not confident	19.9%
Slightly confident	28.3%
Confident	36.7%
Very confident	15.1%

Table 46. Ohio age, by year category (n=263)

Category	Percent
Under 25 years	0.8%
25 to 34 years	9.1%
35 to 44 years	11.0%
45 to 54 years	20.5%
55 to 64 year	28.5%
65 to 74 years	21.3%
75 years and over	8.7%

Note. Mean=56.3, Standard Deviation=14.2.

Table 47. Ohio highest level of education (n=267)

Category	Percent
Less than a high school degree	18.4%
High school graduate/GED	25.8%
2-year college degree	15.4%
4-year college degree	22.8%
Graduate degree	17.6%

Table 48. Ohio gender (n=264)

Gender	Percent
Male	85.2%
Female	14.8%

References

Arbuckle, J.G., J. Hobbs, A. Loy, L.W. Morton, L. Prokopy, and J. Tyndall. 2014. Understanding farmer perspectives on climate change: Toward effective communication strategies for adaptation and mitigation in the Corn Belt. JSWC Nov/Dec 69:6:505-516 Doi:10.2489/jswc.69.6.505.

Arbuckle, J., L.W. Morton, and J. Hobbs 2015. Trust, beliefs, and perceived risk as determinants of farmer support for adaptive and mitigative responses to climate change. Environment and Behavior. 47(2):205-234. DOI: 10.1177/0013916513503832.

Arbuckle, J.G., J. C. Tyndall, L.W. Morton, J. Hobbs. 2017. Climate change typologies and audience segmentation among Corn Belt farmers. Sustainable Corn issue. Journal of Soil and Water Conservation 72 (3):205-214.

Burton, Rob J. F. 2014. “The Influence of Farmer Demographic Characteristics on Environmental Behaviour: A Review.” Journal of Environmental Management 135 (March): 19–26. https://doi.org/10.1016/j.jenvman.2013.12.005.

Forssell, S., and L. Lankoski. 2014. “The Sustainability Promise of Alternative Food Networks: An Examination through ‘Alternative’ Characteristics.” Agriculture and Human Values 32 (1): 63–75. https://doi.org/10.1007/s10460-014-9516-4.

Hoppe, R. A., and J. M. MacDonald. 2013 “Updating the ERS Farm Typology.” USDA: Economic Research Service.

Janssen, B. 2017. Making Local Food Work: The Challenges and Opportunities of Today’s Small Farmers. 1 edition. Iowa City: University of Iowa Press.

Johnson, A. and L. W. Morton. 2015. Midwest Climate and Specialty Crops: Specialty Crop Leaders’ Views and Priorities for Midwest Specialty Crops. Sociology Technical Report 1039. Department of Sociology. Iowa State University, Ames, Iowa 19 pp.

King, R. P., M. S. Hand, and M. I. Gomez, eds. 2015. Growing Local: Case Studies on Local Food Supply Chains. Lincoln: University of Nebraska Press.

Kistner, E., O. Kellner, J. Andresen, D. Todey, L.W. Morton. 2017. Vulnerability of specialty crops to short-term climatic variability and adaptation strategies. Climatic Change doi 10.1007/s10584-017-2066-1.

Knowler, D., and B. Bradshaw. 2007. “Farmers’ Adoption of Conservation Agriculture: A Review and Synthesis of Recent Research.” Food Policy 32 (1): 25–48. https://doi.org/10.1016/j.foodpol.2006.01.003.

McGuire, J.M., L.W. Morton, J.G. Arbuckle Jr., and A.D. Cast. 2015. “Farmer Identities and Responses to the Social-Biophysical Environment.” Journal of Rural Studies 39: 145–55. https://doi.org/10.1016/j.jrurstud.2015.03.011.

Morton, L.W., G. Roesch-McNally, A. Wilke. 2017a. Upper Midwest Farmer Perceptions: Too Much Uncertainty about Impacts of Climate Change to Justify Changing Current Agricultural Practices. Sustainable Corn issue. Journal of Soil and Water Conservation 72 (3):215-225.

Morton, L.W., J. McGuire, A. Cast. 2017b. A good farmer pays attention to the weather. Climate Risk Management 15:18-31 http://dx.doi.org/10.1016/j.crm.2016.09.002.

National Agricultural Statistics Service (NASS). 2016a. "Direct Farm Sales of Food: Results from the 2015 Local Food Marketing Practices Survey." ACH12-35. Washington, D.C: United States Department of Agriculture. https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Local_Food/LocalFoodsMarketingPractices_Highlights.pdf.

———. 2016b. "Executive Briefing: 2015 Local Food Marketing Practices Survey." Washington, D.C: United States Department of Agriculture. https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Local_Food/pdf/LocalFoodsBriefingPresentation_FINAL.pdf.

National Agricultural Statistics Service (NASS) 2012 Census of Agriculture. https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=MICHIGAN.

Palm, C., H. Blanco-Canqui, F. DeClerck, L. Gatere, and P. Grace. 2014. "Conservation Agriculture and Ecosystem Services: An Overview." Agriculture, Ecosystems and Environment 187: 87–105. https://doi.org/10.1016/j.agee.2013.10.010.

Robertson, G. P. 2015. "A Sustainable Agriculture?" Daedalus 144 (4): 76–89. https://doi.org/10.1162/DAED_a_00355.

Schoolman, E. D. 2018. "Do Direct Market Farms Use Fewer Agricultural Chemicals? Evidence from the U.S. Census of Agriculture." Renewable Agriculture and Food Systems, January, 1–15. https://doi.org/10.1017/S1742170517000758.

Appendix

Michigan and Ohio Specialty Crops Growers Study

Project Code: 479

1. In 2016, how many acres did this operation:

		Acres
a. Own?	+	901
b. Rent or Lease from others or use Rent-Free?	+	902
c. Rent to others	-	905
2. Calculate items 1a + 1b - 1c. Then the total acres operated in 2016 was	=	900

USDA defines fresh market produce as vegetables and fruits that are sold raw, without being frozen, cooked, or subject to other forms of preservation prior to sale.

Processed means produce that has been heated, cooked, canned, frozen, dried, mixed with preservatives, or subject to other forms of preservation prior to sale.

3. In 2016, on how many acres did you grow:

	Acres		Acres
a. Vegetables for fresh market	401	c. Vegetables for processing	501
b. Fruit for fresh market	402	d. Fruit for processing	502

If you grow either vegetables or fruit for fresh market, please go to the next question on page 2.

If you do not grow for fresh market, but you do grow vegetables or fruit for processing, please skip directly to Question 8 on page 4.

If you do not grow vegetables or fruit at all on your farm operation, please STOP HERE and mail back this questionnaire using the enclosed envelope. Thank you for your help with this study.

1

Section A: Marketing Channels and Selling Food Locally

4. This question asks about how you sell the vegetables and/or fruit that you grow for fresh market.

During 2016, about how much of the total gross revenue for your farm operation came from the following sources? ***(Please estimate as best you can the percentage of your revenue from each source. Circle one number on each line.)***

	None	Less than 10%	Between 10% – 25%	Between 26% – 50%	More than 50%	*office use only*
a. Wholesalers, distributors, brokers, or packing houses	1	2	3	4	5	410
b. Selling directly to large retailers like Kroger or Meijer	1	2	3	4	5	411
c. Produce auctions	1	2	3	4	5	412
d. Small, independent grocery stores with one or a few locations	1	2	3	4	5	413
e. Farmers markets	1	2	3	4	5	414
f. Community Supported Agriculture (CSA)	1	2	3	4	5	415
g. Sales through your own farmstand or "pick your own" operation	1	2	3	4	5	416
h. Food hub, growers cooperative, or small farms cooperative	1	2	3	4	5	417
i. Selling directly to restaurants or caterers	1	2	3	4	5	418
j. Selling directly to institutions like schools or hospitals	1	2	3	4	5	419
k. Selling to other farmers for resale at a farmers market or other "direct-to-consumer" outlet	1	2	3	4	5	420
l. Value-added products made on-farm or in community kitchens (jams, sauces, cider, etc.)	1	2	3	4	5	421

5. **If <u>any</u> of your farm revenue in 2016 was generated by a source below, please check the box and provide the year it started.** ***(Skip this question if none of your income comes from these sources.)***

	This source has provided income for my farm since... [write year]
a. Produce auctions	430 ☐, since __________
b. Small, independent grocery stores with one or a few locations	431 ☐, since __________
c. Farmers markets	432 ☐, since __________
d. Community Supported Agriculture (CSA)	433 ☐, since __________
e. Sales through your own farmstand or "pick-your-own" operation	434 ☐, since __________
f. Food hub, growers cooperative, or small farms cooperative	435 ☐, since __________
g. Selling directly to restaurants or caterers	436 ☐, since __________
h. Selling directly to institutions like schools or hospitals	437 ☐, since __________
i. Selling to other farmers for resale at a farmers market or other "direct-to-consumer" outlet	438 ☐, since __________
j. Value-added products made on-farm or in community kitchens (jams, sauces, cider, etc.)	439 ☐, since __________

6. **If you sell at farmers markets, please use the lines below to say where these farmers markets are located.** ***(Skip this question if you do not sell at farmers markets.)***

City or town where a farmers market I sell at is located:	**State:**	*office use only*
a.		910
b.		915
c.		920
d.		925

7. **The following questions ask you to estimate how much of what you grow <u>for fresh market</u> is sold within a particular distance from your farm.**

   Please write in the approximate percent for each line, or check "I don't know":

	I don't know	*office use only*
a. Approximately ________ percent of the vegetables and fruit that I grow for fresh market are sold <u>in my county</u>.	450 ☐	451
b. Approximately ________ percent of the vegetables and fruit that I grow for fresh market are sold <u>within 100 miles of my farm</u>.	452 ☐	453
c. Approximately ________ percent of the vegetables and fruit that I grow for fresh market are sold <u>in my state OR within 275 miles of my farm</u>.	454 ☐	455

8. **How important to your future plans for your farm operation is the market for "local food"?** ***(Please check one.)***

   Not important ☐ Slightly important ☐ Important ☐ Very important ☐

   office use only
   460

9. **Please check one box on each line to answer the following questions:**

Have you ever …	Yes	No, but I would like to do this	No, and I am <u>not</u> interested in doing this	*office use only*
a. Worked with nonprofit groups that help farmers to sell food locally?	☐	☐	☐	461
b. Worked with university agricultural extension to learn how to sell food locally?	☐	☐	☐	462
c. Taken advantage of government programs designed to support farmers who sell food locally?	☐	☐	☐	463
d. Donated produce from your farm to food pantries, soup kitchens, or similar organizations (including through gleaning)?	☐	☐	☐	464

Section B: Growing Specialty Crops

10. On your farm, do you use any of the following practices for your <u>vegetable and/or fruit crops</u>? For each practice that you use, please check the box and write the year when you started using it. ***(If you do <u>not</u> use a practice, please leave that line blank.)***

	Yes, I have used this practice since … [write year]
a. Plant cover crops	200 ☐, since ________
b. Intercropping (plant two or more crops in the same rows at the same time)	201 ☐, since ________
c. Crop rotation	202 ☐, since ________
d. Reduced tillage (strip-till, ridge-till)	203 ☐, since ________
e. Continuous no-till (no-till every year)	204 ☐, since ________
f. Maintain portions of crop fields as grass, trees or wild vegetation	205 ☐, since ________
g. Use manure, compost, bone meal, or other organic materials, as a significant source of fertilizer	206 ☐, since ________
h. Nutrient management (testing soil, manure, or plant tissue to determine fertilizer rates)	207 ☐, since ________
i. Biological pest control (use beneficial insects and natural enemies to control pests and weeds)	208 ☐, since ________
j. Integrated pest management (managed use of pest-resistant varieties, scouting and considering pest thresholds before spraying)	209 ☐, since ________
k. Drip irrigation (also called "trickle irrigation")	210 ☐, since ________
l. Drain some or all fields with surface ditches	211 ☐, since ________
m. Drain some or all fields with subsurface tile drains	212 ☐, since ________
n. Precision agriculture with technology such as GPS, GNSS, and variable-rate technology	213 ☐, since ________
o. Use a greenhouse or hoophouse to grow vegetable and/or fruit crops during cold-weather months	214 ☐, since ________

11. What is the <u>minimum</u> width of the buffer strips of grass, trees, or wild vegetation next to streams or creeks on or next to your crop fields? ***(Please check one box for the minimum width of riparian buffer strips, or check the box for "no streams on my crop fields.")***

office use only 225

0–24 feet ☐ 25–49 feet ☐ 50–99 feet ☐ 100 feet or more ☐

No streams or creeks run on or next to my crop fields ☐

12. On your farm, do you carry out the following practices for your <u>vegetable and/or fruit crops</u>? If so, when? ***(Please check <u>all the periods, in 3-month blocks,</u> when you typically carry out a practice. If you do not use a practice, please check "not applicable.")***

I typically…	**in…** ***(please check all periods that apply)***				
	December – February	March – May	June – August	September – November	Not applicable
a. Apply synthetic fertilizer	125 ☐	126 ☐	127 ☐	128 ☐	129 ☐
b. Apply manure, compost, or other organic materials	130 ☐	131 ☐	132 ☐	133 ☐	134 ☐
c. Apply conventional insecticides, herbicides or fungicides	135 ☐	136 ☐	137 ☐	138 ☐	139 ☐
d. Apply organic insecticides, herbicides or fungicides	140 ☐	141 ☐	142 ☐	143 ☐	144 ☐
e. Sow cover crops	145 ☐	146 ☐	147 ☐	148 ☐	149 ☐
f. Till fields	150 ☐	151 ☐	152 ☐	153 ☐	154 ☐

13. Do any of the following descriptions apply to your <u>vegetable and/or fruit crops</u>? If so, please check the appropriate box and write the year when it started to apply. ***(If a description does not apply to your vegetable or fruit crops, please leave that line blank.)***

	Yes, since approximately… [write year]
a. Certified organic or transitioning to certified organic	230 ☐, since __________
b. Organic in practice, but not certified or transitioning to certified	231 ☐, since __________
c. "No-spray"	232 ☐, since __________

6

Section C: Other Information

14. How influential are the following groups and individuals when you make decisions about your farm operation? ***(Please circle one number on each line.)***

	On my farming, this group has…			
	No influence	Some influence	Strong influence	*office use only*
a. Other farmers	1	2	3	240
b. Landlord or management firm	1	2	3	243
c. Private crop or livestock consultant	1	2	3	244
d. Sales representatives for seeds, crop varieties, pesticides or fertilizers	1	2	3	245
e. Food wholesalers or distributors, grocery store chains, or other large buyers	1	2	3	246
f. Feedback from individual consumers, independent grocery stores, or other small buyers	1	2	3	247
g. Major farm organizations with a broad focus (Farm Bureau, Vegetable Growers, etc.)	1	2	3	248
h. Farm organizations focused on local food	1	2	3	249
i. Farm organizations focused on sustainable farming	1	2	3	250
j. Government agriculture or conservation agencies	1	2	3	251
k. University Extension (staff, online info, etc.)	1	2	3	252
l. Conservation or environmental groups	1	2	3	253
m. Food safety third party auditors and consultants	1	2	3	254

15. How active are you with farm or agriculture organizations? ***(Please check <u>as many boxes</u> as apply.)***

a. I read their mailings, email updates, etc.	260 ☐	c. I attend at least one meeting a year	262 ☐
b. I pay membership dues	261 ☐	d. I serve on committees or in leadership roles	263 ☐

16. <u>How concerned</u> are you about the following problems for your farm operation? *(Please circle one number on each line.)*

	Not concerned	Slightly concerned	Concerned	Very concerned	*office use only*
a. Increased flooding	1	2	3	4	270
b. Longer dry periods and drought	1	2	3	4	271
c. Increased weed or insect pressure	1	2	3	4	272
d. Changes in health or timing of pollinators	1	2	3	4	273
e. Higher incidence of crop disease	1	2	3	4	274
f. More frequent extreme rains	1	2	3	4	275
g. Fluctuations in spring temperatures	1	2	3	4	276
h. Increased heat stress on crops	1	2	3	4	277
i. Unavailability of workers for my farm	1	2	3	4	278
j. More buyers requiring food safety audits, such as USDA-Harmonized Good Agricultural Practices (GAP), Good Handling Practices (GHP), etc.	1	2	3	4	279

17. Over the past five years, have you…

	Yes	No	*office use only*
a. Experienced significant drought on the land you farm?	☐	☐	280
b. Had problems with saturated soils or ponding on any of the land you farm?	☐	☐	281
c. Experienced significant flooding on any of the land you farm?	☐	☐	282

18. Given recent changes in weather and climate in the Midwest, please provide your opinions on the following statements. ***(Please circle one number on each line.)***

	Disagree	Uncertain	Agree	*office use only*
a. I have the knowledge and technical skills to deal with most weather-related threats to my farm operation	1	2	3	290
b. I have the financial resources to deal with most weather-related threats to my farm operation	1	2	3	291
c. My farm operation will likely benefit from climate change	1	2	3	292
d. There's too much uncertainty about the impact of climate change to justify changing my farming practices/strategies	1	2	3	293
e. My farm operation will likely be harmed by climate change	1	2	3	294
f. Available best management practice technologies may not be enough to protect my farm from the impacts of climate change	1	2	3	295
g. Climate change is not a big issue because human ingenuity will enable us to adapt to changes	1	2	3	296

19. Please think about how you make decisions about your farm operation, and rate the importance of the following items. ***(Please circle one number on each line.)***

For your farm operation, how important is it for you to…	Not important	Slightly important	Important	Very important	*office use only*
a. Use the latest seed and chemical technology	1	2	3	4	301
b. Minimize nutrient runoff into waterways	1	2	3	4	302
c. Use cover crops between harvest and planting	1	2	3	4	303
d. Be active in your community	1	2	3	4	304
e. Think about the health of people who eat food grown on your farm	1	2	3	4	305
f. Have the most up-to-date equipment	1	2	3	4	306
g. Minimize soil erosion	1	2	3	4	307
h. Maintain habitat for wildlife	1	2	3	4	308
i. Keep your fields clean	1	2	3	4	309
j. Support other businesses in your community	1	2	3	4	310
k. Have the highest yields per acre	1	2	3	4	311
l. Maintain or increase soil organic matter	1	2	3	4	312
m. Avoid fall tillage	1	2	3	4	313
n. Be active in farm organizations	1	2	3	4	314
o. Work to get healthy food to people who cannot afford it	1	2	3	4	315
p. Have the highest profit per acre	1	2	3	4	316
q. Consider the health of streams on/near your land to be your responsibility	1	2	3	4	317
r. Minimize the use of pesticides and fungicides	1	2	3	4	318
s. Share equipment with friends and neighbors	1	2	3	4	319
t. Create opportunities for people to learn about farming	1	2	3	4	320
u. Put long-term conservation of farm resources before short-term profits	1	2	3	4	321
v. Create economic opportunities for other people in your community	1	2	3	4	322
w. Help friends and neighbors with farm tasks	1	2	3	4	323
x. Manage for both profitability and minimization of environmental impact	1	2	3	4	324
y. Be a leader in your community	1	2	3	4	325
z. Minimize tillage	1	2	3	4	326

Section D: Characteristics of your Farm Operation

20. What year did you become the operator of your <u>current</u> farm operation? 601 **Year: _________**

21. What year did you become the operator of <u>any</u> farm operation? 602 **Year: _________**

22. On your farm, what kinds of crops do you grow <u>for sale</u>? ***(Please check all that apply.)***

a. chives, garlic, leeks, or onions	330	☐	k. sweet corn (<u>not</u> corn for grain)	340	☐
b. leafy greens (lettuce, spinach, kale, chard)...	331	☐	l. berries (any kind)	341	☐
c. stalk greens (asparagus, celery, rhubarb)	332	☐	m. herbs	342	☐
d. tomatoes, peppers, or eggplant	333	☐	n. corn for grain or silage	343	☐
e. squash, pumpkin, cucumber, or melon	334	☐	o. wheat, small grains, or oats	344	☐
f. potatoes (any kind)	335	☐	p. soybeans	345	☐
g. apples, pears, or other tree-fruits	336	☐	q. sugarbeets	346	☐
h. peas or snap beans	337	☐	r. hay or other forage crops	347	☐
i. carrots, table beets, other root crops	338	☐	s. flowers, ornamental shrubs/trees	348	☐
j. grapes	339	☐	t. other	349	☐

23. On your farm, do you raise any livestock or livestock products <u>for sale</u>? ***(Please check all that apply.)***

a. dairy cattle	350	☐	e. hens or pullets for eggs	354	☐
b. beef cattle	351	☐	f. broilers (chickens for meat)	355	☐
c. hogs	352	☐	g. turkeys	356	☐
d. sheep and/or goats	353	☐	h. other	357	☐

24. If you plant cover crops, which cover crops do you generally use? ***(Please check all that apply.)***

a. Rye	360	☐	e. Clover	364	☐	i. Oats	368	☐
b. Barley	361	☐	f. Wheat	365	☐	j. Peas	369	☐
c. Vetch	362	☐	g. Sudan-grass	366	☐	k. Mustard	370	☐
d. Radish	363	☐	h. Buckwheat	367	☐	l. Other	371	☐

25. During 2016, did you or your farm operation receive any revenue from any of the following sources? ***(Please check all that apply.)***

a. Providing services or consulting to other farmers (planting or harvesting on contract, other custom work, seed sales, equipment rental, etc.)	380	☐
b. Agri-tourism (outdoor activities, farm tours, and "pick-your-own" operations)	381	☐
c. Leasing or renting out your property for non-farm uses (hunting, weddings, etc.)	382	☐

26. Please answer the following questions about your work situation:

	Yes	No	Not applicable	*office use only*
a. In addition to your farm occupation, do you have any off-farm occupations?	☐	☐		603
b. Do you spend the majority (50 percent or more) of your worktime on off-farm occupations?	☐	☐	☐	604

27. If you have a spouse, please answer the following questions about his/her work situation. If you do not have a spouse, please skip to Question 28.

	Yes	No	*office use only*
a. Does your spouse do farm work on your farm operation?	☐	☐	605
b. Does your spouse spend the majority (50 percent or more) of his/her worktime on off-farm occupations?	☐	☐	606

28. How many of the following types of workers were employed on your farm in 2016? ***(Please fill in the number of workers in each box.)***

	How many worked on your farm in 2016?
a. Family members	610
b. Permanent employees (121 days or more per year)	611
c. Seasonal workers (120 days or less per year)	612
d. Migrant workers (seasonal workers who travel to do farm work)	613
e. Interns or volunteers	614

29. About how much of your total household income in 2016 came from your farm? ***(Please fill in the blank below.)***

620

Approximately _______ percent of my household income in 2016 came from my farm.

30. Ideally, how much of your total household income would you like to come from your farm? ***(Please fill in the blank below.)***

621

My goal is for _______ percent of my household income to come from my farm.

11

31. How confident are you that, five years from now, your farm will be able to provide you with the income that you are hoping for? *(Please check one.)*

office use only 622

Not confident ☐ Slightly confident ☐ Confident ☐ Very confident ☐

623

32. What was your age on Jan. 1, 2017? _________ years

33. What is your highest level of education? *(Please check one.)*

Less than a high school degree ... ☐
High school graduate/GED .... ☐
2-year college degree ...... ☐
4-year college degree ...... ☐
Graduate degree .... ☐

office use only 624

34. What is your gender? Male ☐ (625) Female ☐ (626)

35. Please check the box that best describes the total gross revenue from your farm operation in 2016.

Less than $10,000 .... ☐
$10,000 – $49,999 .... ☐
$50,000 – $149,999 .... ☐
$150,000 – $349,999 .... ☐
$350,000 – $999,999 .... ☐
$1,000,000 or more .... ☐

office use only 627

Respondent Name: _________________

9911	9910 MM DD YY

This completes the survey. Thank you for your help.

Office Use Only										
Response		Respondent		Mode		Enum.	Eval.	R.	Chang	Office Use for POID
1-Comp 2-R 3-Inac 4-Office Hold 5-R – Est 6-Inac – Est	9901	1-Op/Mgr 2-Sp 3-Acct/Bkpr 4-Partner 9-Oth	9902	1-Mail 2-Tel 3-Face-to-Face 6-e-mail 7-Fax 19-Other	9903	9998	9900	9921	9985	9989 Optional Use 9907 9908 9906 9916
S/E Name										

12